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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/782,988	02/20/2004	Vishal Kathuria	MSFT-2732/305554.01	7139

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EXAMINER

SYED, FARHAN M

ART UNIT	PAPER NUMBER
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2165

MAIL DATE	DELIVERY MODE
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PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary

Application No.

10/782,988

Applicant(s)

KATHURIA ET AL.

Examiner

Farhan M. Syed

Art Unit

2165

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 08 November 2007.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-21 and 23-28 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-21 and 23-28 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
 - ☐ Certified copies of the priority documents have been received in Application No. _____.
 - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|--|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input checked="" type="checkbox"/> Interview Summary (PTO-413) |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____ |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

1. Claims 1-21 and 23-28 are pending.

Claim Rejections - 35 USC § 103

2. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

3. Claims 1-21 and 23-28 are rejected under 35 U.S.C. 103(a) as being unpatentable over Lomet (U.S. Patent No. 5,933,838) in view of Hind et al (U.S. Patent Pub. 2004/0024795 A1 and known hereinafter as Hind).

As per claims 1, 11, and 21, Lomet teaches a method for reading a changed data page, said method comprising of storing data associated with the change in a transaction log buffer (i.e. *"The application state (i.e., address space) is treated as a single object that can be atomically flushed in a manner akin to flushing individual pages in database recovery techniques. And like the pages of the database, log records describing application state changes are posted on the stable log before application state is flushed."*)(Column 5, lines 43-48); and flushing the transaction log to the persistent data store, prior to the changed data page being read (i.e. *"Flushing the application state to stable storage effectively installs the application operations logged in the stable log."* *"According to one implementation, a database computer system has a processing unit, a volatile main memory that does not persist across a system crash, and a stable memory that persists across a*

system crash." The preceding text clearly indicates that the flushing the application logs to in a stable log that resides on a stable memory (which is a persistent data store) within a database computer system is the process of performing a durable read.)(Column 5, lines 54-56 and lines 62-65) (i.e. *"Posting the read values to the log is helpful in one sense because the cache manager is not concerned about which sequence to flush objects. Certain object states need not be preserved by a particular flushing order because any data values obtained from an object which are needed to redo an application operation are available directly from the stable log."* The preceding text clearly indicates that a lazy transaction is the posting of values to the log irrespective of the sequence of flushing the objects in a particular order.)(Column 6, lines 43-48).

Lomet does not explicitly teach said method comprising making a change to the data page to generate a changed data page; marking a durability indicator associated with the data page that indicates that the changed data page has yet to be written to a persistent data store.

Hind teaches said method comprising changing a data page generating the changed data page in response to a change to the data page (i.e. *"Data record synchronization systems are known in this field. Generally, these systems utilize a single "change number" for maintaining synchronicity between data records stored on multiple databases. The change number is initially synchronized to a particular value (such as 1) when the records are stored to the databases. If the record is changed at one of the databases, the change number at that database is incremented, and a message is sent to the other databases indicating that a change has occurred to the particular data record."* The preceding text clearly indicates that making a change to the data page is the record that is changed at one of the database and generating a changed data page is the message that is sent to the other databases that a change has occurred in the particular database.)(Paragraph [0004]); marking the changed data page to indicate that the transaction log buffer has yet to be flushed to a persistent data store (i.e. *"Data record synchronization systems are known in this field.*

Generally, these systems utilize a single "change number" for maintaining synchronicity between data records stored on multiple databases. The change number is initially synchronized to a particular value (such as 1) when the records are stored to the databases. If the record is changed at one of the databases, the change number at that database is incremented, and a message is sent to the other databases indicating that a change has occurred to the particular data record." The preceding text clearly indicates that a durability indicator is a flag, similar to a "change number" indicating that a change data page has yet to be written.)(Paragraph [0004]); determining whether the changed data page is marked.

It would have been obvious to a person of ordinary skill in the art at the time of Applicant's invention to modify the teachings of Lomet with the teachings of Hind to include a method comprising making a change to the data page to generate a changed data page; marking a durability indicator associated with the data page that indicates that the changed data page has yet to be written to a persistent data store with the motivation to optimize techniques to make read, write, and recovery phases more efficient (Lomet, Abstract).

As per claims 2 and 12, Lomet teaches a method further comprising: unmarking the changed data page when the transaction log buffer is flushed (i.e. *"The application state is treated as a single object that can be atomically flushed to the stable database. In addition, the application operations often cause changes to the data pages, records, or other types of objects stored in the volatile cache. The modified objects that result from application operations are from time to time flushed to the stable database. The flushed application states and objects are assigned state IDs to identify their place in the execution sequence. Flushing the application object effectively installs all the*

operations, updating the application operations that are in the stable log which have earlier state IDs.")(Column 6, lines 22-32).

As per claims 3, 13, and 23, Lomet teaches a method wherein flushing the transaction log buffer occurs when the changed data page is marked (i.e. *"Flushing the application state to stable storage effectively installs the application operations logged in the stable log."* *"According to one implementation, a database computer system has a processing unit, a volatile main memory that does not persist across a system crash, and a stable memory that persists across a system crash."*)(Column 5, lines 54-56 and lines 62-65), and wherein said method further comprises reading an unmarked data page as part of a read operation that uses data that has been stored in the persistent data store without first flushing said transaction log buffer (i.e. *"The application state (i.e., address space) is treated as a single object that can be atomically flushed in a manner akin to flushing individual pages in database recovery techniques. And like the pages of the database, log records describing application state changes are posted on the stable log before application state is flushed."*)(Column 5, lines 43-48).

As per claims 4, 14, and 24 Lomet teaches a method wherein marking the changed data page comprises writing a value of a bit associated with said changed data page (i.e. *"Each data structure has an object identifier field 131, 132 to hold the object identifier (e.g., A or O), a state identifier field 133, 134 to hold the state ID for the value of the object, a dirty flag field 135, 136 which holds a flag bit indicating whether or not the object has been modified in volatile cache without those modifications being flushed to stable memory, and a cache location field 137, 138 to hold an address to a location in volatile cache where the current cached value of the object physically resides."*)(Column 18, lines 51-59).

As per claims 5, 15, and 25, Lomet teaches a method wherein the bit is stored in said changed data page (i.e. *"Each data structure has an object identifier field 131, 132 to hold the object identifier (e.g., A or O), a state identifier field 133, 134 to hold the state ID for the value of the object, a dirty flag field 135, 136 which holds a flag bit indicating whether or not the object has been modified in volatile cache without those modifications being flushed to stable memory, and a cache location field 137, 138 to hold an address to a location in volatile cache where the current cached value of the object physically resides."*)(Column 18, lines 51-59).

As per claims 6, 16, and 26, Lomet teaches a method wherein the bit is stored in a reference table (i.e. *"Each data structure has an object identifier field 131, 132 to hold the object identifier (e.g., A or O), a state identifier field 133, 134 to hold the state ID for the value of the object, a dirty flag field 135, 136 which holds a flag bit indicating whether or not the object has been modified in volatile cache without those modifications being flushed to stable memory, and a cache location field 137, 138 to hold an address to a location in volatile cache where the current cached value of the object physically resides."*)(Column 18, lines 51-59).

As per claims 7, 17, and 27, Lomet teaches a method wherein marking the changed data page comprises recording, in a reference location associated with said changed data page (i.e. *"The resource manager tags the application states at these interaction points by assigning them state IDs."*)(Column 6, lines 17-20), a copy of a log sequence number from said transaction log buffer and corresponding to the change to the data page (i.e. *"The flushed application states and objects are assigned state IDs to identify their place in the execution*

sequence. Flushing the application object effectively installs all the operations, updating the application operations that are in the stable log which have earlier state IDs.")(Column 6, lines 27-32).

As per claims 8 and 18, Lomet teaches a method wherein said copy of the log sequence number is stored in said changed data page (i.e. *"The flushed application states and objects are assigned state IDs to identify their place in the execution sequence. Flushing the application object effectively installs all the operations, updating the application operations that are in the stable log which have earlier state IDs.*")(Column 6, lines 27-32).

As per claims 9 and 19, Lomet teaches a method wherein said copy of the log sequence number is stored in a reference table (i.e. *"The flushed application states and objects are assigned state IDs to identify their place in the execution sequence. Flushing the application object effectively installs all the operations, updating the application operations that are in the stable log which have earlier state IDs.*")(Column 6, lines 27-32).

As per claims 10, 20, and 28, Lomet teaches a method wherein the copy of the log sequence number is used to identify a transaction in order to cause said transaction to effect the flushing of the transaction log buffer (i.e. *"The object table includes fields to track dependencies among the objects. In one implementation, the object table includes, for each object entry, a predecessor field which lists all objects that must be flushed prior to the subject object, and a successor field which lists all objects before which the subject object must be flushed. In another implementation, the object table contains, for each object entry, a node field to store dependencies in terms of their nodes in a write graph formulation.*")(Column 6, lines 62-67; column 7, lines 1-4).

Response to Remarks/Argument

4. Applicant's arguments filed 08 November 2007 have been fully considered but they are not persuasive for the reasons set forth below.

Applicant argues:

(1) "The Examiner pointed to MPEP 2141.02(VI) as support for the assertion that one of ordinary skilled in the art would have been led to consider flushing prior to reading as claimed..."

After further consideration of the prior art with respect to Applicant's arguments submitted on 08 November 2007, the Examiner maintains the position that the combination of Lomet and Hind teach the aforementioned limitations of claims 1 and 11.

(2) "Lomet clearly discourages 'flushing the transaction log to the persistent store data, prior to the changed data page being read,' as claimed by the Applicants. Rather Lomet teaches reading prior to flushing."

The Examiner disagrees. The combination of Lomet and Hind teaches flushing (i.e. flushing)(column 5, lines 54-56) the transaction log (i.e. application log)(column 5, lines 54-56) to the persistent store data (i.e. stable memory)(column 5, lines 62-65), prior to the changed data page being read (i.e. *"Flushing the application state to stable storage effectively installs the application operations logged in the stable log."* *"According to one implementation, a database computer system has a processing unit, a volatile main memory that does not persist across a system crash, and a stable*

memory that persists across a system crash." The preceding text clearly indicates that the flushing the application logs to in a stable log that resides on a stable memory (which is a persistent data store) within a database computer system is the process of performing a durable read.)(Column 5, lines 54-56 and lines 62-65) (i.e. ***"Certain object states need not be preserved by a particular flushing order because any data values obtained from an object which are needed to redo an application operation are available directly from the stable log."***) The that preceding text clearly indicates that with certain object states need not be persevered by a particular flushing order, suggests that flushing may occur prior to changed data page being read.)(Column 6, lines 43-48).

(3) "Hind does not teach, and in fact makes no mention or suggestion of indicating whether a transaction log buffer has been flushed to a persistent data store."

The Examiner disagrees. The combination of Lomet and Hind teaches indicating (i.e. "change number" The preceding text clearly indicates that the change number is a marker that is used to maintain synchronicity between data records stored on multiple database systems.)(Hind, paragraph [0004]) whether a transaction log buffer (i.e. application log)(Lomet, column 5, lines 54-56) has been flushed (i.e. flushing)(Lomet, column 5, lines 54-56) to a persistent data store (i.e. stable memory)(Lomet, column 5, lines 62-65).

Hence, the Applicant's arguments do not distinguish over the claimed invention over the prior art of record.

Any other arguments by the applicant are either more limiting than the claimed language or completely irrelevant.

Conclusion

5. **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

Contact Information

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Farhan M. Syed whose telephone number is 571-272-7191. The examiner can normally be reached on 8:30AM-5:00 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Christian Chace can be reached on 571-272-4190. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

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Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

/FMS

A handwritten signature in black ink, appearing to read 'Christian Chace', with a long horizontal line extending to the right.

CHRISTIAN CHACE
SUPERVISORY PATENT EXAMINER
TECHNOLOGY CENTER 2100